

RAPRENOx Hits the Outside World

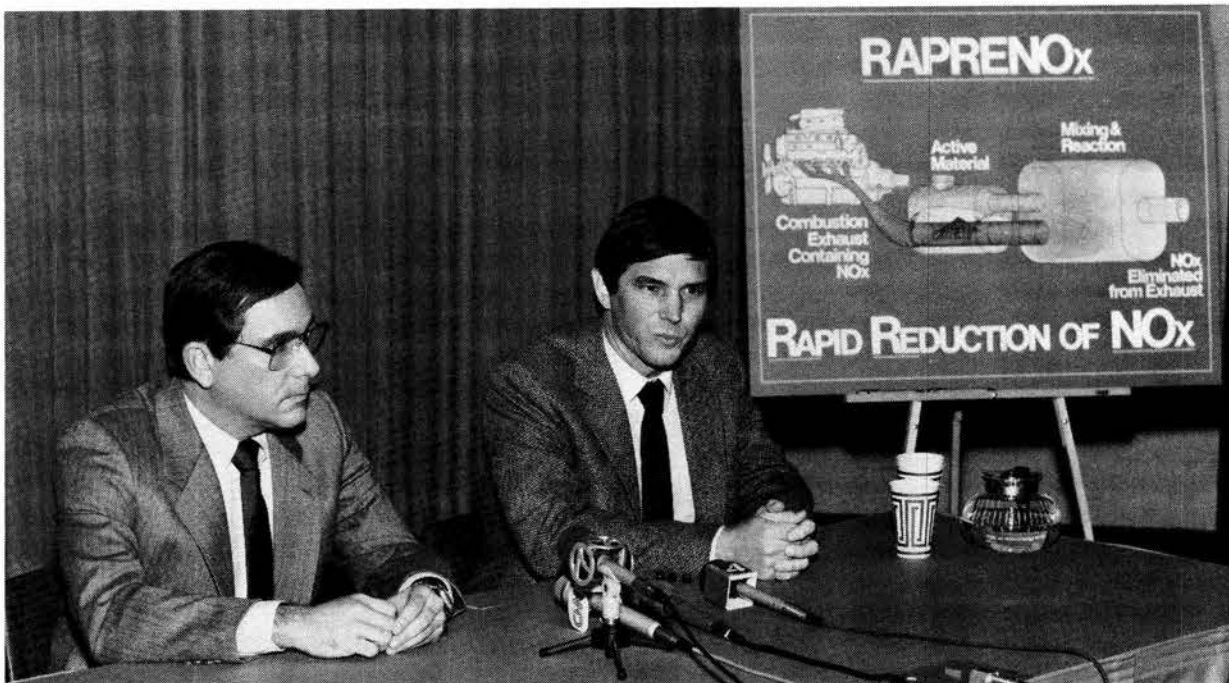
The Dec. 17 public announcement on the discovery of a chemical means for removing nitrogen oxides (NOx) from exhaust gases—RAPRENOx—focused more attention on Sandia Livermore than did any previous accomplishment.

The press conference held by RAPRENOx inventor Bob Perry (8353) and Director of Combustion & Applied Research 8300 Peter Mattern at the Combustion Research Facility auditorium one week before Christmas attracted three television stations and 10 representatives of the print media—including both the AP and UPI wire services.

In addition to the media present that day, dozens more contacted Bob and other Sandians by phone for interviews. The result was additional articles in the *New York Times*, the *Washington Post*, the *Wall Street Journal*, and other major U.S. newspapers, as well as some in England, Germany, and Japan. The press conference was timed to coincide with publication of an article on RAPRENOx by Bob and his colleague Dennis Siebers (8362) in the British journal *Nature*.

After fielding nearly an hour of questions from the media representatives at the press conference, Bob commented, "It was a very interesting experience. The reporters seemed friendly — and informed on technical aspects of the process involved. And the articles that grew out of the press conference were a good representation of what we talked about. Since then, I've had very positive feedback on the media coverage from agencies that are trying to control

(Continued on Page Three)



ANNOUNCING THE DISCOVERY of RAPRENOx at the press conference were its inventor, Bob Perry (8353; right), and Peter Mattern (8300).



X-ray Scattering Tool

Sandians Fired Up on Ceramics Research

In searching for keys to improved ceramics materials, a group of Sandia researchers has developed new tools for studying ceramic precursors, the materials that eventually become a finished ceramic.

"We're trying to predict the nature of the formation and structure of the precursor materials," says Dale Schaefer, supervisor of 1152. "Instead of a 'cook and look' process of trial and error, we want to apply fundamental principles of chemistry and physics to define specific products we are seeking."

Applying such principles, and seeing the process and product of their interaction in real time, is made possible by use of a small-angle X-ray scattering machine. Keith Keefer (1845) brought expertise in this technology to Sandia about six years ago, and has developed a unique small-angle instrument at the Labs. The machine directs a beam of X-rays into the material being studied; a detector plate then records the scattering pattern that is produced.

"What is exciting about the X-ray scattering approach is that we can actually see the nucleation of the precursor particles in real time," Keith says. Such direct observation of the formation of the particles aids understanding of the major factors affecting precursor formation.

Precursor Growth Models

The small-angle X-ray scattering device has also given feedback on another important development — computer simulations of precursor formation. Dale and Keith have developed growth models (verified by X-ray scattering analysis) that allow computer simulation of both compact colloidal materials and rough colloidal materials. Earlier models simulated only compact colloids; modeling of rough colloids allows analysis of ceramic precursors whose texture can be utilized, in some applications, to support catalysts.

Alan Hurd (1152) has used the computer simulation work to model two-dimensional aggregation of precursor particles. "In an experimental situation, I floated precursor-like particles on water to achieve

a two-dimensional environment," Alan explains. Alan used an optical microscope with a video hook-up (see photo) to observe the real-time development of charged precursors. Computer simulations then confirmed that an electrical charge has a significant effect on the formation of colloidal aggregates.

Electrical charge had not previously been known to affect precursor structure; this insight could contribute to the development of more compact precursor colloids, leading to denser and harder ceramics.

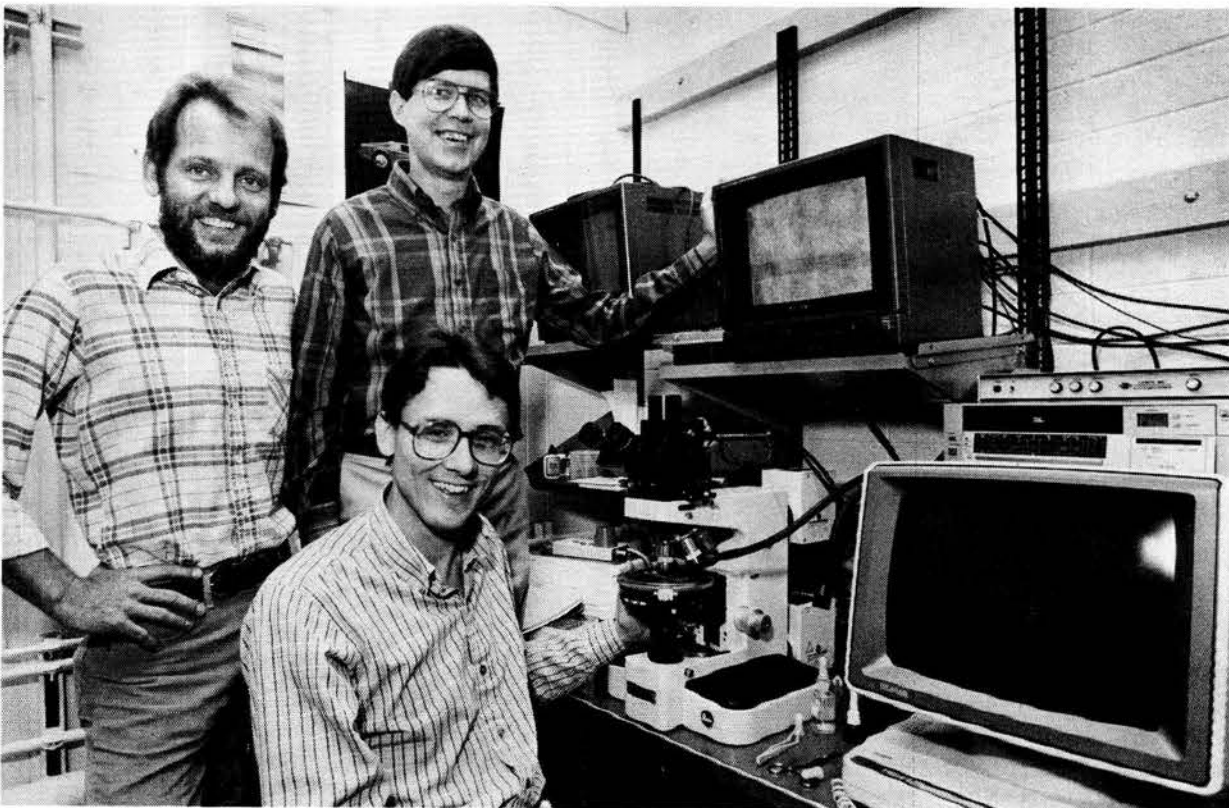
Jeff Brinker (1846) has been working on sol-gel coatings at SNL since 1979. In the sol-gel technique, precursor materials in solution are spread on

a substrate; when the solvent evaporates, a gel film is left (see LAB NEWS, April 29, 1983). Jeff is interested in taking the insights from the work of Keith and Dale and making practical applications.

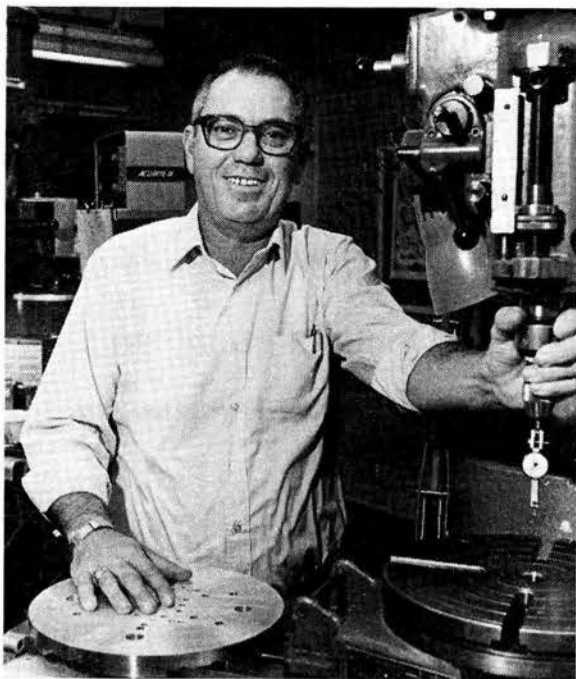
Tailoring Sol-Gel Coatings

For example, the work that has led to the identification of major factors in precursor formation may eventually allow Jeff to develop more effective coating materials. "We are usually looking for a dense,

(Continued on Page Four)



ALAN HURD (1152) is seated in front of the optical microscope with video link used in ceramic precursor studies. Standing, from left, are technicians Ed Vernon, who worked on the development of the X-ray scattering device, and Dave Evans (both 1152), who contributed to the optical microscope apparatus.



ROBERT CROTZER (7481)

Supervisory Appointment


ROBERT CROTZER to supervisor of Project Machining Section B 7481-5, effective Nov. 1.

Robert has been a machinist at Sandia since he joined the process development labs in July 1967. Before coming to Sandia, Robert was a machinist at ACF Industries. He served six years in the U.S. Navy and has been active in the Naval Reserve for 20 years, currently attached to a reserve mobile construction battalion (Seabees) out of Dallas.

Robert and his wife Agnes are active in veterans' activities in the Albuquerque area. He was state commander of the American Legion in 1979-80.

Robert and Agnes have five children and live in the NE Heights.

A Bird, Plane, or Superroach?

 Some Agricultural Research Service/University of Florida researchers brought back roaches from Washington, D.C., when congressmen complained about sharing their cramped quarters with the pests. The insects had evolved a resistance to so many pesticides that they defied control. "When we found they lacked carbamate resistance, we crossed them with a Florida strain that is highly resistant to carbamate [pesticides]," Phillip Koehler says. The result, he says, is "a cockroach that is virtually impossible to kill."

At a minimum, the superroach makes a great research tool . . . But it may also serve a more important purpose, Koehler jokes: With the Gramm-Rudman-Hollings deficit-reduction bill making federal research money tight, "we figured we could threaten to turn them loose if we didn't get funded. We have a quarter million of them."

Science News

LAB NEWS

Published Fortnightly on Fridays

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Antojitos

The Media Splash As the front page story indicates, RAPRENOx put Sandia into the news in a big way back on Dec. 18. (Next time though we'll arrange with Nicaraguan President Daniel Ortega to avoid pardoning any gunrunners on the day after we stage a press conference.) RAPRENOx, in fact, generated more media attention for Sandia Livermore than anything since Harvey Pouliot (ret.) announced his variable displacement engine to the world back in October 1976. The queries on RAPRENOx (hereby acclaimed Sandia's most awkward word to type, thanks to that lower case x at the end) are still coming in, reports LAB NEWS Livermore reporter Barry Schrader (8302). In fact, he's threatening to lobby for a RAPRENOx Information Clearing House separate from the SNLL Public Info Office that he and Cindy English man/woman.

While we're at it, thanks to Barry for staging the press conference and for coordinating all the media inquiries, to Ken Frazier (3161) for writing the original press release, and to Nigel Hey (3161) for choreographing the whole effort. It was a NOx-out event!

* * *

The Media Spurt In his column in Tuesday's Journal, Jim Arnholz asked, "How would you like to be at a cocktail party where you've been forced to listen to some Sandia Labs computer genius drone on about chips, bytes, and random access memory for an hour and a half . . . ?" Okay, you computer geniuses -- both of you -- read up on RAPRENOx, and, next time, impress Arnholz by droning on about acid rain and photochemical smog.

* * *

Snoozer Alarm Irwin Welber's response to a warning from Public Relations DM Jim Mitchell that Jim's call requesting a decision on weather-induced changes in the Labs' work schedule might come in the wee hours of the morning: "How do you say 'Sorry, wrong number' in Spanish?"

* * *

If Your TV Were a Horse, You'd Have to Shoot It An ad in LAB NEWS, placed by retiree Josephine Bazar, requested a pictureless TV for a blind couple. The ad resulted in about 30 replies, with sets ranging from 12-inch to 5-foot models. Thanks, tubeless Sandians.

* * *

Want to Stay Healthy? "Choose your parents carefully," says Lois Amsden (2631). She just celebrated 30 years of Sandia service (see the Mileposts section), and she hasn't been sick a day since she signed in. (Is that a record? "Could be," says Medical.) "Basically, I've developed the habit of going to work every day," she says. "But that's been easy because I've been blessed with good health, friendly co-workers, and great bosses. I enjoy living too; I still go out dancing till midnight -- whenever I can find a man who can keep up."

* * *

Word of the Month: It's "prostate," not "prostrate," though the latter is what you are (and probably supine, not prone) during the operation to have the former overhauled.

* * *

Grammarians Without Shame, Chapter Two Maury Karnowsky (1832) called to tell me that after his wife, suffering from diverticulitis, had part of her colon removed, he referred to her remaining tubing as a semi-colon.

* * *

Chuckles in the Job Postings According to the Jan. 8 Weekly Bulletin, A. C. Watts is looking for an electrical engineer. "Well, naturally," says Bob Manhart (3151).

●BH

* * *

If you torture the data long enough, it will confess. --Ronald Coase

Fun & Games

Bowling— SANDOE November Bowler-of-the-Month awards went to: Men's Scratch, Bob Barton (3742), 744; Women's Scratch, Barbara Hilton (DOE), 587; Men's Handicap, Reggie Tibbetts (7815), 715; Women's Handicap, Nellie Gerchow, 664.

The next tournament will be a No Tap/Scotch Doubles on Jan. 17-18 at Holiday Bowl.

* * *

Skiing— Budding schussboomers should take note that Alpine (downhill) ski lessons for beginners only are available from SERP beginning in February. This class is taught by the Sandia Peak Ski School. Three class dates are offered: Feb. 8, 15, or 22. Cost is \$20 plus equipment and includes all-day group lift ticket and poma lift ticket. And, for those who prefer a more sedate way to slip along on the snow, check out the Nordic (cross-country) one-day ski lesson for intermediate skiers. The class meets

Feb. 7 and will tour the major trails of Sandia Crest with instructor John Shunny (ret.). Cost is \$15 plus equipment. Call the SERP office on 4-8486 to sign up for either class or to get more information.

* * *

Jazzercise— This nationally known program is now offered through SERP. The group meets Tuesdays and Thursdays from 5-6 p.m. at Sandia Base Elementary School (across the street from the C-Club). Cost is \$2 for tickets purchased as a group (\$3 for walk-ins). The class is taught by Linda Collins of Jazzercise. For more information, call the SERP office on 4-8486.

* * *

Softball— Jody Sanchez (2642) is looking for former high school or college softball players to form a highly competitive fast-pitch softball team. Aggressive players can contact Jody on 6-0972.

The Washington Times

THURSDAY, DECEMBER 18, 1986

New process cleans diesel fumes

San Francisco Examiner

Thursday, December 18, 1986

THE NEW YORK TIMES,

Combating Smog

New weapon in smog battle

Lab test utilizes chemical to render nitrogen oxide harmless

THE TRIBUNE, Oakland, California

Los Angeles Times

Thursday, December 18, 1986

Chemical process cuts smog, acid rain from diesel, coal

New Process Cuts Pollution by Diesels, Coal-Fired Plants

(Continued from Page One)

RAPRENOX

NO_x, from people who are making diesel engines, and from those involved in power plants, cogeneration, and the gas turbine industry."

Deluge of Phone Calls

Calls began flooding in the day following the press conference, and the volume of inquiries required the services of a temporary staffer just to handle the phone and mail out material requested by interested individuals, companies, and government agencies—both domestic and foreign. Callers ranged from fellow scientists with technical questions to a New York stockbroker who wanted to know why he couldn't

U.S. DEPARTMENT OF ENERGY
OFFICE OF THE PRESS SECRETARY
WASHINGTON, DC 20585

DOENNEWS:

find Sandia listed on the New York Exchange. (It is, of course, because Sandia is a wholly owned subsidiary of AT&T Technologies, Inc.)

Bob has had calls not only from the U.S. but from Germany, Italy, England, Australia, and Jap-



SANDIA LIVERMORE NEWS

VOL. 39, NO. 1

SANDIA NATIONAL LABORATORIES

JANUARY 16, 1987

THE WALL STREET JOURNAL

Scientists Discover Possible Smog Cure In Pool Chemical

* * *
Cyanuric Acid, a Stabilizer For Chlorine, Could Cut Some Car Emissions 99%

anese manufacturers and news agencies. "I didn't expect the volume of response that resulted," he said. "People from Hawaii and Canada even contacted me at home over the holidays."

Bob traveled to Los Angeles Jan. 6 at the request of the South Coast Air Management District to discuss his findings. Later this month the Environmental Protection Agency is sending a contingent of 20

technical staffers out to learn more about the process. And, of course, Bob's been invited to appear on radio talk shows.

Peter (who opened the press conference by describing Sandia generally and the Combustion Research Facility specifically) is pleased with the response: "All of us are astonished and gratified by the overwhelming response to our announcement."

The Washington Post

New Process Could Cut Urban Smog, Acid Rain

Nitrogen Oxides Removed From Exhaust

The large number of international inquiries was totally unexpected. Importantly, the TV and newspaper reporting was accurate, and preserved our emphasis on the scientific accomplishments being published.

"It is obvious that the nation continues to be very concerned with the problems associated with smog, acid rain, and other combustion-generated pollutants that pose a major threat to our environment," continued Peter. "The interest generated by this discovery can be expected to continue through the three-to-five year development stage of a prototype device."

"Everyone in combustion research is hoping this method proves to be as promising as the early indicators have shown in lab tests," he concluded. "This kind of payoff from our basic research helps justify our programs — to ourselves and our sponsors back at DOE headquarters. We all wish Bob the very best as he prepares to go out on his own to pursue the commercialization of RAPRENOX."

Congratulations

Gina (8180) and Emmanuel Lamons, a daughter, Malia Danielle, Jan. 2.

Sympathy

To Rick Wayne (8400) on the death of his mother near Chicago, Jan. 4.



TV CAMERAS and reporters' questions were aimed at Bob and Peter for an hour as they discussed the implications of removing NO_x from exhaust emissions. In left foreground is Dennis Siebers (8362), who co-authored with Bob the first major article on RAPRENOX; it appeared Dec. 18 in the British magazine *Nature*.

(Continued from Page One)

Ceramics

small-pored material to act as a coating," Jeff says. "We can tailor both the chemical composition and microstructure of the coatings to achieve the qualities we need in a given material."

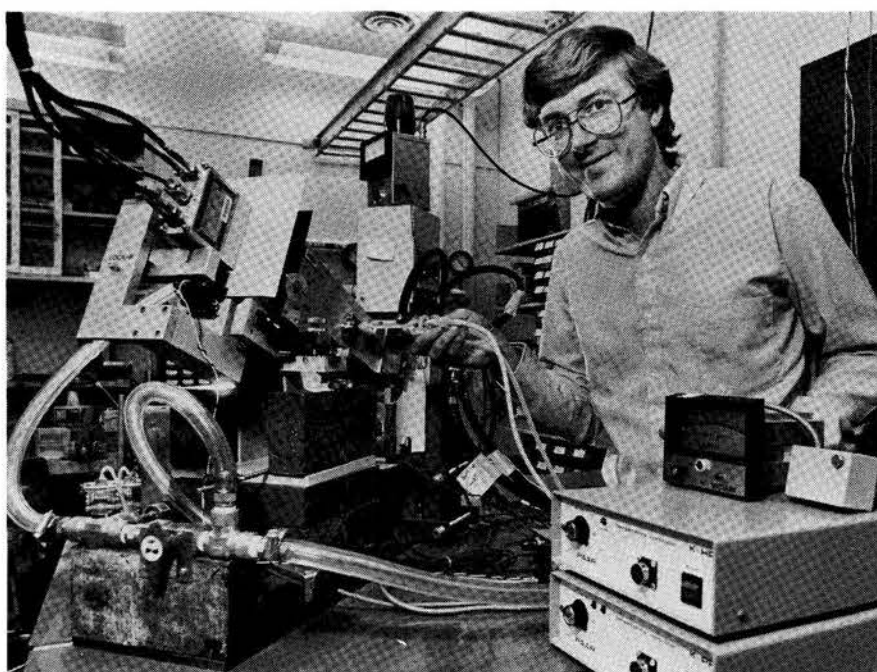
Dale notes that the group has an excellent mix of skills to pursue the research they're interested in. "I'm a polymer physicist, Jeff is a ceramist, Keith is a silicate geochemist, and Alan is a colloid physicist. We've each brought insights into aspects of the program that have advanced the work as a whole."

The four researchers recently received a Basic Energy Science Materials Science Award from DOE (see LAB NEWS, Nov. 7, 1986). The project, "Growth and Structure in Ceramic Precursors," has already yielded valuable insight into the formation of precursor materials. Although each Sandian in the project has specific research interests, these interests all contribute to the overall goal: a better understanding of precursor formation that may eventually lead to improved ceramic materials. ●BG



JEFF BRINKER (1846) displays mirrored stainless steel substrate created through a sol-gel process. This unit is part of the flexible solar mirror project; the work to achieve the increased size of such mirrors was done by Carol Ashley (1846) and Scott Reed (7471).

KEITH KEEFER (1845) holds the mixing cell that combines reagents and allows the mixture to enter the X-ray scattering machine. The development of ceramic precursors can be monitored in real time with the device.



Take Note

Bob Stromberg (4030) was general chairman of the Fall 1986 meeting of the Federal Laboratory Consortium for Technology Transfer held in Albuquerque. The theme of the meeting was "Changing Methods in an Era of Change." Irwin Welber (1) and Everet Beckner (5000) were among the speakers at the event.

Wayne Trump (3521) has been invited to serve on the Consortium for Research and Development in Occupational Education (CRDOE), a statewide advisory council. The group is sponsored by UNM and is active in a number of education projects such as a series of videotapes involving classroom "survival skills" for new instructors.

Julia Gabaldon (3523) was appointed to serve on the Albuquerque Distinguished Teacher Selection Committee. The 10-member committee selects outstanding teachers in the Albuquerque Public School system.

Mary Ann Sweeney (1265) has been selected secretary of the international Nuclear and Plasma Sciences Society of IEEE. The two-year position involves communicating meeting results to administrative committees.

The following sessions from Sandia's Nov. 5 "Career Conference for Women" are now available on videotape: "Image of the Professional Woman" by Sharon Niederman; "Conflict Resolution/Negotiation" by Tasia Young; "Leadership . . . and All That Stuff!" by Warren Klein (3523); and "Men & Women in Supervision" with panelists Barry Granoff (6254), Joan Woodard (8316), Jack Rex (3437), and Dori Miller (7543). Betty Harris's luncheon address

on "Managing Your Abilities" and President Welber's opening remarks are also on tape. VHS tapes may be borrowed from the Tech Library; U-matic tapes are available by calling Margaret Harvey (3510), women's program coordinator, on 4-9482.

The Institute of Environmental Sciences will hold its 9th Annual International Symposium on Contamination Control Sept. 26-30 at the Century Plaza Hotel in Los Angeles. The theme for the conference is "Exploring World Partnerships in Technology." The conference is held under the auspices of the International Committee of Contamination Control Societies (ICCCS) every two years in one of the nine member countries. The goal of ICCCS is to promote exchange of state-of-the-art information on controlling contamination in high technology manufacturing environments (those necessary to produce semiconductors and pharmaceutical products, for example). For further information, contact Janet Ehmann, Executive Director, Institute of Environmental Sciences, on (312) 255-1561.

The New Mexico Museum of Natural History is conducting an afterschool program for elementary students. Activities in science, art, and music include fossil and rock studies, sculpture, use of microscopes, and games. Different aspects of natural history will be explored on field trips and at the Museum. Sessions for grades 1-3 began Jan. 12 and run through March 11. Grades 3-5 will meet from March 16 through May 20, excluding April 13 and 15. Participants meet twice weekly, Mondays from 4-5:30 p.m. and Wednesdays from 2-5:30 p.m. The cost is \$75 for each 9-week session. For more information, call the Museum on 841-8837.

Welcome

Albuquerque

Gerald Brown (3432)
Susan Compton (121)
Martin Dylski (3315)
Chris Lanes (7266)
Patrick Long (3426)
Richard Shagam (7556)
Otis Stewart (6256)
James Wadell (7212)

Louisiana

Jeffrey Jortner (2814)

Massachusetts

Gerard Sleaf (6256)

New Mexico

Anne Poore (3151)

New York

Jeffrey Kawola (1811)

Oregon

Patrick Leahy (9233)

Texas

Steven Gray (5268)

Utah

Roland Phillips (7172)

Cryptozoology (unproved sightings of large animals such as the Loch Ness Monster) and fringe archaeology (ancient astronauts) are just two of the topics covered in *Science Confronts the Paranormal* (Prometheus, 1986). Edited by Ken Frazier (3161), the anthology consists of 40 articles by 33 authors (psychologists, philosophers, and physical scientists, including biochemist Isaac Asimov) on all branches of the paranormal and of fringe science. The book consists of articles selected from 1981-85 issues of *Skeptical Inquirer*, a quarterly journal founded 10 years ago by the Committee for the Scientific Investigation of Claims of the Paranormal and edited by Ken. The new book, a companion volume to the earlier *Paranormal Borderlines of Science*, received favorable reviews in *Nature* and *New Scientist*.

Fifty bachelors to the highest bidders! Here's an 80s way of beating the dating game and contributing to the Cystic Fibrosis Foundation at the same time. Fifty of Albuquerque's most eligible bachelors go up for auction at "Bachelor Bid," a fund-raising event on Friday, Jan. 30 at the new Holiday Inn Pyramid. The women "buy" the bachelor, and the bachelors provide the date. Some dates available include sailing the San Diego Bay on a yacht with all the frills, ski trips, a flight to Phoenix for an evening of dining and dancing, and bird-watching over wine at sunset at Bosque Del Apache. Admission to the event is \$10 for women and \$100 for men. Tickets are available through the Cystic Fibrosis office and at the door. For more information, call 255-7507.

Ins and Outs of Tech Libraries Detailed in Sandian's First Book

Three years and countless hours after she started the project, Nancy Pruett (3142) finally saw her book on the functions and management of scientific and technical research libraries roll off the press in December.

"Back in the early 80s, shortly after I joined Sandia, I became aware of the need for a book that details what goes on in sci/tech libraries," says Nancy. "Nothing covering the subject had been written since 1972 — and let's face it, the library business has been revolutionized since that time.

"Automation is only one of the factors that have brought tremendous changes to libraries," she continues. "I hope my book, *Scientific and Technical Libraries*, will provide librarians a starting place for information about any particular function — and there are many — of a sci/tech library."

The 568-page-long book, in two volumes, was published by Academic Press, Inc., as part of its *Library and Information Science Series*. The extensive bibliography lists hundreds of references.

Primary Audience

The primary audience, according to Nancy, is the professional librarian who is knowledgeable in one area of sci/tech libraries, but who needs to know about others. "For instance, what if you're a reference librarian who suddenly finds yourself in charge of collection development or space planning?" Nancy comments. "You have a whole new world on your hands, and not much time to learn about it. That's where I think my book can help."

Others who will find the book useful are sci/tech library managers who don't need to do everything that librarians do, but who must determine that the library is functioning as it should. Librarians suddenly thrust into sci/tech libraries from other environments could use the book as a quick reference to find out what's different about their new surroundings. And teachers of special library courses might find it helpful in preparing students headed for sci/tech library careers.

Nancy called on seven contributors — specialists who know certain areas better than she does, she freely admits — to write some chapters in the book. For example, Sharon Kurtz (2624), a former systems analyst in Sandia's technical library, wrote a lengthy chapter titled "Library Automation."

The other local contributor, Stephen Rollins of



HOT OFF THE PRESS is Nancy Pruett's (3142) first book, *Scientific and Technical Libraries*. It's an extensive reference guide for librarians working in a sci/tech research environment.

UNM's Zimmerman Library, wrote a section on document delivery. "Stephen handles all of Sandia's interlibrary loan requests for material — not only from Zimmerman, but from libraries all over the world," says Nancy. "He's a real expert on document delivery, and that's why I asked him to write the chapter on that subject."

Nancy wrote the book on her own time, with prior approval from management and Sandia's Book Publication Review Committee. "Most weekdays I'd work on the book from 4:30-6:30 p.m.," she says. "Then I'd go home and crash. And then there were the weekends . . . unfortunately, I missed out on some skiing along the way." Nancy says there's no way to figure how many hours she spent on the project, but "this was my first book, and I had no idea at the beginning how much time would be involved. I do know that Joy Bemserfer [contractor employee in 6320] spent 30 hours just to prepare the index; I really appreciated her thoroughness and enthusiasm.

Help Along the Way

"My management was tremendously supportive," continues Nancy, "and constantly amazed that I'd taken on such a large and thankless task on my own time. And I received a great deal of help from many Sandia colleagues along the way — I couldn't

have done it without them. The tasks were many: feedback on the initial outline, review and comments on certain sections, reference retrieval, photocopying, clerical help, illustrations. Labs support was first-class."

Nancy acknowledges that support in a long list of credits at the beginning of her book. Sandians who helped are: Gloria Zamora (400); Sally Landenberger, Chris Morgan, Patricia Newman, Pat Chisholm, Sharon Gorman, Connie Souza, Janet Padilla, Peggy Poulsen, Vic Dickerson, Gloria Canon, Paula Webb (all of Technical Library Department 3140); Lee Garner (3151); and Bruce Fetzer (3155).

Similar acknowledgement went to Nancy's management throughout the book-writing process: Calla Ann Pepmueller (ret.), George Dalphin (now 3144), Danny Brown (now 3520), Doug Robertson (3140), and Dennis Rowley (3142).

When is Nancy going to start on her next book? "Probably not tomorrow," she says, grinning. ●PW

(Ed. Note: Nancy Pruett joined Sandia's technical library as a reference librarian in April 1981; last July she switched to systems analysis. Previously, she was the geology librarian at UCLA for five years. She has a BS in geology from Rice, a Master's in library science from Texas Women's University, and an MBA from SMU.)

Events Calendar

- Jan. 16-17 — NM Symphony Orchestra, Classical Concert V: guest artist, James Van Demark; guest conductor, David Efron; 8:15 p.m., Popejoy Hall, 843-7657.
- Jan. 16-18 — World of Wheels Car Show, noon-11 p.m., Albuquerque Convention Center, 768-4575.
- Jan. 16-26 — Exhibit, "Kukulcan and Awanyu: One Image, Two Cultures," iconography of the feathered serpent in Central America and New Mexico; 9:30 a.m.-5:30 p.m., Indian Pueblo Cultural Center, 843-7270.
- Jan. 16-Feb. 1 — "K2" (after a climbing accident, two men struggle for survival on the the world's second highest mountain); 8 p.m. Fri.-Sat., 6 p.m. Sun.; Vortex Theatre (Central & Buena Vista), 247-8600.
- Jan. 16-Feb. 2 — "Maya, Treasures of an Ancient Civilization"; 11 a.m.-5 p.m. Tues., 1-9 p.m. Wed., 11 a.m.-9 p.m. Thurs.-Fri., 10 a.m.-5 p.m. weekends; Albuquerque Museum, 243-7255 or 242-4600.
- Jan. 16-Feb. 4 — Exhibit, "Terra Maya," photos depicting Mayan art and architecture based on nature; New Mexico Museum of Natural History, 841-8837.
- Jan. 16-Feb. 6 — "The Maya," photographs by archaeologists, featuring Peter Harrison; and "Il-

- ustrations of Ancient Tikal," featuring Peter Spier; South Broadway Cultural Center, 848-1320.
- Jan. 16-July 31 — Exhibit, "Maya: The Image from the Western World"; 9 a.m.-4 p.m. Mon.-Fri., 10 a.m.-4 p.m. Sat.; main gallery, Maxwell Museum of Anthropology, 277-4404.
- Jan. 17 — "Breakfast with the Beasts," continental breakfast at the zoo; includes talk by zoo veterinarian and tour of diet room and animal feeding areas; 9-11 a.m., Rio Grande Zoo, 843-7413.
- Jan. 17 — "Women of the Southwest," a glimpse at the history of the region through the eyes of the children and mothers who settled it; 1 p.m., UNM Continuing Education Conference Center, 277-3751.
- Jan. 17 — Showtime at the KiMo — Music, Music, Music Series: John Bayley, reggae; 8 p.m., KiMo Theatre, 848-1374.
- Jan. 18 — Arioso Chamber Players, 4 p.m., St. Thomas of Canterbury Episcopal Church, 247-2515.
- Jan. 18 — On Broadway at South Broadway: John Bayley, reggae; includes "All About Reggae," discussion and demonstration for kids; free, 3 p.m., South Broadway Cultural Center, 848-1374.
- Jan. 18 — 1986-1987 Fine Arts Music Series, "The

- Company," presentation includes opera, musical comedy, and oratorio; 4 p.m., First United Methodist Church, 243-5646.
- Jan. 20 — Showtime at the KiMo — Dancin' Series: Nian Weiner & Dancers, post-modern dancing; 8 p.m., KiMo Theatre, 848-1374.
- Jan. 23-Feb. 8 — "Baby," musical focusing on three couples as they progress through the nine longest months of their lives together; 8 p.m. Tues.-Fri., 6 & 9 p.m. Sat., 2 p.m. Sun.; Albuquerque Little Theatre, 242-4750.
- Jan. 24-25 — "The Pied Piper," 1:30 & 3:30 p.m., Popejoy Hall, 888-3644.
- Jan. 25 — Showtime at the KiMo — Music, Music, Music Series: Larry Graham, classical piano, plus a wilderness film; 7 p.m., KiMo Theatre, 848-1374.
- Jan. 28-Feb. 15 — New Mexico Repertory Theatre's production of "The Taming of the Shrew"; 8 p.m. (2 p.m. Sun.), KiMo Theatre, 243-4500.
- Jan. 30-31 — "Romeo and Juliet," classical ballet by the Southwest Ballet Company; 8:15 p.m., Popejoy Hall, 294-1423.
- Jan. 30-Feb. 1 — Antique show and sale; 12-9 p.m. Fri., 12-8 p.m. Sat., 12-6 p.m. Sun.; Albuquerque Convention Center, 268-5122.

HRA Earmarks 'People Factors' in Nuclear Power Plants

"Most accidents at nuclear power plants are caused not by equipment failures but by equipment and procedures not well designed for human use," says Alan Swain (DMTS, 7223). "I learned long ago that inattention to human factors can mess up a system. People — at all levels, from the manager to the operator — make the big mistakes."

The price for errors is immense. "Any disaster in a nuclear power plant, anyplace in the world, has an adverse impact on nuclear energy everywhere else," says Alan. Witness Three Mile Island. And Chernobyl.

Yet those two accidents, in a figurative chain-reaction, magnified the value of Alan's work. That's because his primary goal is to reduce human errors in complex systems such as power plants. Alan was named a DMTS at Sandia three years ago for his work on Human Reliability Analysis (HRA).

Originally, he began development of his HRA methodology for application to weapons. In 1961 he took part in early studies of the Permissive Action Link (PAL), a vital device in command/control. Twelve years later this methodology was applied to assess the impact of potential human errors in accident sequences at nuclear power plants.

"An important part of my job is to transfer the HRA technology to nuclear power plant operators here and abroad," he continues. "DOE supports Sandia's sharing of this methodology with other nations through the auspices of the IAEA [International Atomic Energy Agency]."

Trained as an experimental psychologist (with a PhD from Ohio State), Alan has developed a training course on HRA as part of his work at Sandia and in support of the IAEA, an agency related to the United Nations. Also, he and Hank Guttman (ret.) compiled a 700-page HRA handbook for the NRC (Nuclear Regulatory Commission) three years ago. The handbook shows how to estimate the probabilities of human error and how to mathematically model the performance of human operators.

Alan's data and methodology are used by the systems analysts in Reactor Systems Safety Analysis Division 6412. Supervised by Allen Camp, the group is responsible for PRA (Probabilistic Risk Assessment), an evaluation of the overall odds of failure in components and systems at nuclear power



INFORMAL GET-TOGETHER with students at a beer garden in Ljubljana: Alan Swain (7223, second from right) and Jan Van Erp (third from right) of Argonne National Lab, organizer of the two-week IAEA course in Yugoslavia.

plants. "I help them with the HRA part of PRA," says Alan.

He first taught the HRA course about 11 years ago in Sweden, England, France, and South Africa. Later he taught it for DOE and the NRC. And last May he offered a two-day short course on the same topic to a dozen students in Ljubljana, Yugoslavia. That course was organized by Jan Van Erp of Argonne National Lab and funded by IAEA.

Workshop in Yugoslavia

Alan gave his talk on "Human Factors and Man/Machine Interface" right after the Chernobyl accident, which provided a case history to analyze. The course was meant for everyone in the nuclear power plant hierarchy, from the actual operator to the plant superintendent (see "Swain Made Side Trips").

"To help people observe basic precautions, you have to transfer expertise at their level," says Alan. "In fact, my impression is that an operator with a PhD tends to look for an exotic solution to a problem. A high school graduate — if he has the proper training and procedures — can more easily learn to find a commonsense solution."

The main problem at Chernobyl, according to

Alan, is that the operators shortcut many safety features when they ran some experiments. "I can't imagine any team deliberately bypassing so many safety features in one of our plants," he says. "If a plant is well designed and the operators well trained, the job is usually routine — nothing out of the ordinary happens."

Alan's teaching focuses not on theory but on practical aspects, primarily "performance-shaping factors." The ones he considers most important are the level of stress or fatigue; the extent of practice in coping with unusual events; the design of displays, controls, and procedures; and the on-the-job interrelationships among people. Behavioral situations can be scored, according to these factors, to show the odds for operator error on all important tasks.

Focus on 'Failure Mode'

"I am most concerned with failure modes," says Alan. "I keep track of scenarios where many things can go wrong — realistic risks that I can identify to the proper authorities."

Some solutions are simple. The procedures for using equipment may be rewritten. For example, the steps for activating a backup pump may be simplified.

Or, the equipment can be made more compatible with the people who work there. "I may be analyzing a control room that looks like someone grabbed a basketful of switches, meters, and chart recorders and threw them on the wall, where they just stuck," Alan notes. "Then it's a matter of sorting out the functional groups of displays and outlining them with either sticky tape or background colors. Or I can have the labels changed to more clearly show what goes with what."

Yet there's much more to his work than devising new color codes for knobs and dials. The toughest task for Alan is dealing with administrative procedures: "I have to get a feel for how well operators really follow the rules. Sometimes that's a judgment call. And one of my big pitches to management is to collect more data on human performance and not to penalize people for telling the truth about problems they've had."

The ultimate thing Alan does is to improve the efficiency of decision making. He trains supervisors to be aware of behavior problems. He helps operators understand what is happening so that they can do the right thing, right away — and not run for the hills or become panic-stricken. "The required responses to an unusual situation have to be immediately obvious to the operators," says Alan. "People can't afford to spend too much time on interpreting what's going on."

Despite Alan's best efforts, there is no such thing as a permanent guarantee of error-free watchfulness. "Sometimes you can't do the best thing because of the huge costs involved in changing the design," says Alan. "There's always a trade-off somewhere. But it's important to balance out human and systems considerations for the best possible match." ●ID

Swain Made Side Trips To Carlsbad East, Beer Garden

The Yugoslavians that Alan Swain (DMTS, 7223) met during his trip last May are proud of some caverns outside Ljubljana he dubbed Carlsbad East. Their feelings are stirred not only by the caves' geological beauty but also by their symbolism: Resistance groups stored their munitions there during WW II.

"Tito is still the people's hero [he died in 1980], because of his assertive stance against the Soviet Union," says Alan. "And it's very important to them that they be considered Westerners. They hate being called Eastern Europeans."

Alan was surprised, he says, that the country is not a somber police state. "People freely criticize the system — among each other and in talking to foreigners," he says, "and they're warm and friendly."

Ljubljana (Lyooob-LYAHN-uh), one of the largest cities in Yugoslavia, seemed to him to combine the best of Bavaria and Italy. "The beer's fantastic, the food's heavy, and everyone loves to sing," he remembers. The single canal that weaves through the city creates a relaxing backdrop for the cafes and beer gardens (see photo).

The older generations speak German (learned during the Nazi occupation), but the younger ones speak English. That made it easy for Alan to con-

verse with his students at the Josef Stefan Institute about the news of the day — and the previous month's accident in the Soviet Union.

Fallout from Chernobyl

He says the Chernobyl accident made people angry. They resent the release of radioactivity over Ljubljana. (The city had a heavy rain at the time and so received a much heavier fallout than did Kiev.) "All interviewees were disgusted and/or angry at the censorship and misleading statements put out by Soviet officials," says Alan. "A frequent comment was that such behavior was, however, to be expected."

Alan's course on "ergonomics" (the anglicized European term for human factors engineering) was somewhat formal. In Yugoslavia, "the students are brought up with much more respect for professors [than they are in the U.S.]," Alan recalls. "They are reluctant to interrupt in class and ask questions."

"But as soon as there's a coffee break, they open up," he continues. The students made plain their worries about quality assurance at the one on-line nuclear power plant in their own country. In fact, an engineer at the Institute told Alan that the Chernobyl disaster had given rise to Yugoslavia's first anti-nuclear-power movement.

Q. I read in the LAB NEWS article on performance evaluation that fairness and communications are of great concern in the minds of the management here at Sandia. It must be recognized that those of us who are not management must depend on those of you who are management for our salary raises, yet the reverse is not true. So how can an atmosphere of fairness and honest communication occur when those in management hold all the cards, so to speak? You state that the system is not perfect and that it is not carved in stone. In other words, it can be changed. Well, then, let's change things a bit, and have non-management staff give management grades in performance just as the management grades the non-management staff. If this change occurred, with the grade given to management directly affecting their salaries, I think the so-called atmosphere of fairness and truly honest two-way communication could exist with a greater concern from the management towards those working under them.

A. I believe that we are both troubled when fairness and communication are missing from performance appraisal meetings. It is my impression that there is a temptation for both supervisors and staff to spend much of the performance appraisal discussion talking about peripheral issues rather than focusing on the employee's work and contribution.

The LAB NEWS article was prepared and published last summer as a timely reminder to both supervisors and staff of the purpose of the appraisal meeting. It is my hope that this article encourages both supervisors and staff to have informative, open dialogues on performance issues.

Let me quote some important ideas about the staff-supervisor discussion expressed in the article:

"It's a golden opportunity for two-way feedback . . . This is a chance for two people to exchange perceptions on how they see the work at hand, and how they feel about that work. It's a time to explore changes . . ."

— Lee Bray

"A relationship of mutual respect and trust between a person and his or her supervisor is essential for the process to work well. It is important that supervisors spend a lot of time listening at those appraisal meetings. That is the only way they will learn about the individual on the other side of the table."

— Pace VanDevender

It is my position that effective two-way communication will result in the informative and useful appraisal meetings that we both desire. Formal staff ratings of supervisors could be counterproductive and cause the discussions to deteriorate rather than improve.

I want to assure you that supervisors also receive performance ratings and discuss their performance with their department manager in appraisal meetings. The performance ratings for supervisors are determined by the same collective judgement process used for staff; their contributions, which includes how well they manage and develop employees, are rated and merged at successively higher organization levels based on the combined judgements of their department managers, directors, and vice-presidents.

Thank you for expressing your concerns and I earnestly encourage you to have an honest dialogue with your supervisor during your performance appraisal meetings.

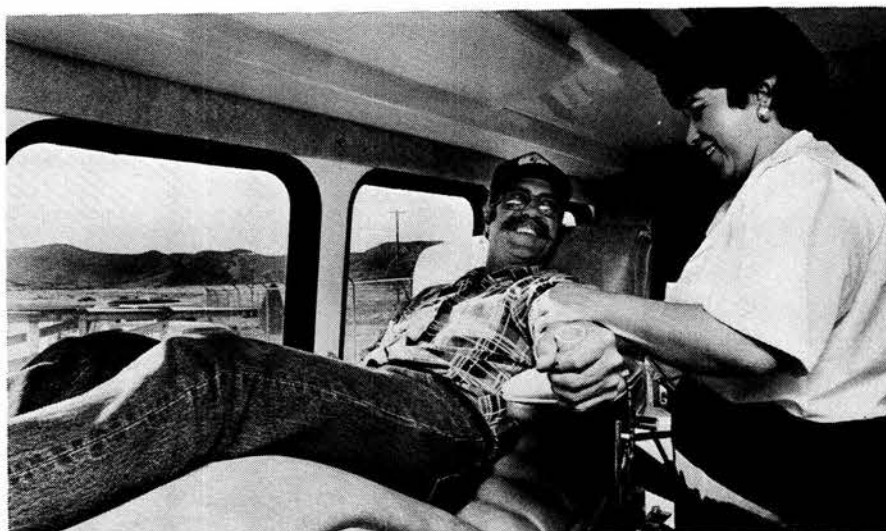
Ralph Bonner - 3500

Congratulations

Liz Scott-Patterson (3153) and Paull Patterson (1233), a son, Robert Scott, Sept. 16.

Deborah and Andy (5123) Rogulich, a son, David Andrew, Dec. 23.

Cindy (2314) and Daniel (2312) Caton, a son, Sean Daniel, Jan. 4.



'A PIECE OF CAKE,' says blood donor Tom Stueber (7535), after Carol Encinias from United Blood Services took a pint from his arm. Tom took the 10-minute procedure lying down — right in the MBC (Mobile Blood Center), as the new van is equipped with a comfortable bed. Sandians donated 1250 units of blood in 1986. With the help of the MBC, which puts even Sandia's remotest sites into blood-mobile range, that impressive total could rise in 1987.



SHARING TECH LIBRARY'S GALLERY SPACE for the last three months were artists (from left) Rusty Ganzerla (ret.) and Fred Yost (6332). "Arc de Triomphe" and "Fiddler from Lubbock" were only two of the works in the exhibit, originally put up by Joe Laval (3163) for Family Day. Any Sandia employees, past or present, who work in the visual arts are welcome to contact Marge Meyer (3144) for a screening of their portfolios.



ALL SMILES, as befits the occasion — the DOE Distinguished Associate Award to Charlie Winter (center), retired Director of Management Staff 400. After opening remarks by President Welber, the award was presented by AL Manager Ray Romatowski (right), who acclaimed Charlie's longtime "senior counsel" role and noted that "Charlie's contributions have been appreciated not only by AL and Sandia but by other labs and federal agencies." Charlie, the third Sandian to receive the award (former President George Dacey and former executive VP Tom Cook preceded him), was touched by the tribute: "I'm lucky to have spent my professional career at Sandia, both Albuquerque and Livermore, with a stint at the AEC in Washington. It's a great community, one that strives for excellence in a challenging and important job, and one that's shaped by the spirit of technical and managerial excellence — and honesty — fostered by AT&T. I appreciate that. And best of luck to a community I dearly love!"

Yellowstone in Winter—Wildlife and Few Tourists

by John Shunny (ret.)

It was in the late 40s that I first read A. B. Guthrie's *The Big Sky*, the now-classic saga of the "mountain men" of the 1820s and 30s. The Big Sky country (the mountain regions of what is now western Wyoming and Montana) is where these men, usually alone, dared to trap the beaver while beset by hostile Indians, an unforgiving climate, and, occasionally, an unfriendly grizzly.

It's a marvelous story, and as you read it you cannot but envy the mountain men, perhaps wishing you had been born a century or so earlier so that you too might have seen the West as they found it, pristine, untouched by settlement and civilization.

Retroactive births being difficult to arrange, the next best is a visit to the Big Sky country itself, to a great extent included within two national parks—Yellowstone and Grand Teton. Neither is untouched—a few million tourists ramble through during the summer—but there is an alternative to the bumper-to-bumper discord of summer: Go to the parks in the winter.

Last February, we spent six days in Yellowstone, cross-country skiing near Mammoth Hot Springs and Old Faithful, and at other sites within the fifty miles that separate these two. We saw elk, buffalo, a grizzly track (we think), geysers, fumaroles, hot springs, boiling pools, sparkling streams, and mountain ranges. And other tourists—at Old Faithful, many; at other places, few to hardly any.

You don't have to be a skier to appreciate the special beauty that snow brings to Yellowstone. Staying at the pleasant lodge in Mammoth Springs were the skiers and snow shoers, but also some number of people who were neither. On a typical morning, ten or twelve of us would pile into a snow



SHUNNY SHOT these buffalo before he learned how dangerous the usually docile beasts can be.

coach—a comfortable tracked vehicle for over-snow travel. It might take us ten miles to, say, Indian Creek, from whence several cross-country ski trails, well-marked, took off. The non-skiers/snowshoers would remain with the snow coach, stopping at various scenic sites where the snow was usually walkable, having been packed down by previous traffic.

Snow coaches are the basis of Yellowstone winter touring. Skiers and snowshoers take them short distances to trailheads, making appointments to be picked up later in the day. While these rides are matters of minutes, the 50-miler from Mammoth to Old Faithful takes four hours. Our Bombadier snow coach broke down at Madison, 16 miles from Old Faithful, but we filled the three-hour delay with a delightful ski tour along the Gibbon River. The many buffalo and elk peacefully grazing along the river were a scene straight from a Currier and Ives print.

We spent two days in the Old Faithful area. No phenomenon can live up to the hype that has been lavished on this geyser, and when each eruption is preceded by the arrival of a swarm of snowmobilers, maybe a hundred or more, well it sort of takes the edge off the event. But Old Faithful is just one of 15 or more geysers and other geothermal phenomena in the river valley, so we simply skied off up the valley, enjoying the sights. Since snowmobilers are restricted to the roads, skiers can quickly leave them out of sight and sound.

Later, we returned to Mammoth Hot Springs for a final two days of ski touring. We lucked out; Yellowstone can be sub-zero in February, but we had brilliant skies with warm temperatures, much like New Mexico in the spring. "Most unusual," the natives kept muttering.

Logistics: Air to Bozeman, Mont., was \$218; the six-day package of lodging, bus from Bozeman, and snow coach to Old Faithful came to \$195. Local snow coach trips were \$4 to \$7. Dinners at the local eatery were good, \$8 to \$12.

X-C SKIER (and author) John Shunny (below) takes a high-level phone call.



OLD FAITHFUL erupts every 70 or so minutes. It attracts hordes of snowmobilers; other geysers are less crowded, more appropriate to the quiet of X-C skiing.

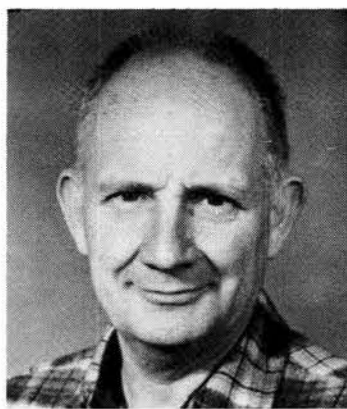


SNO-CATS of various types (skis for steering, tracks for traction) make the long hauls simple. Group here is admiring Obsidian Cliffs.

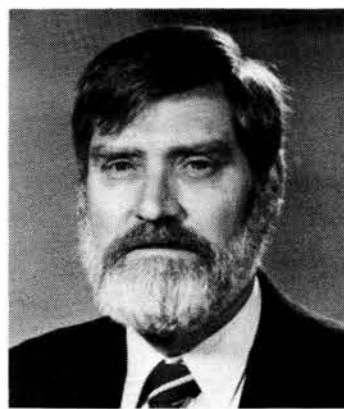
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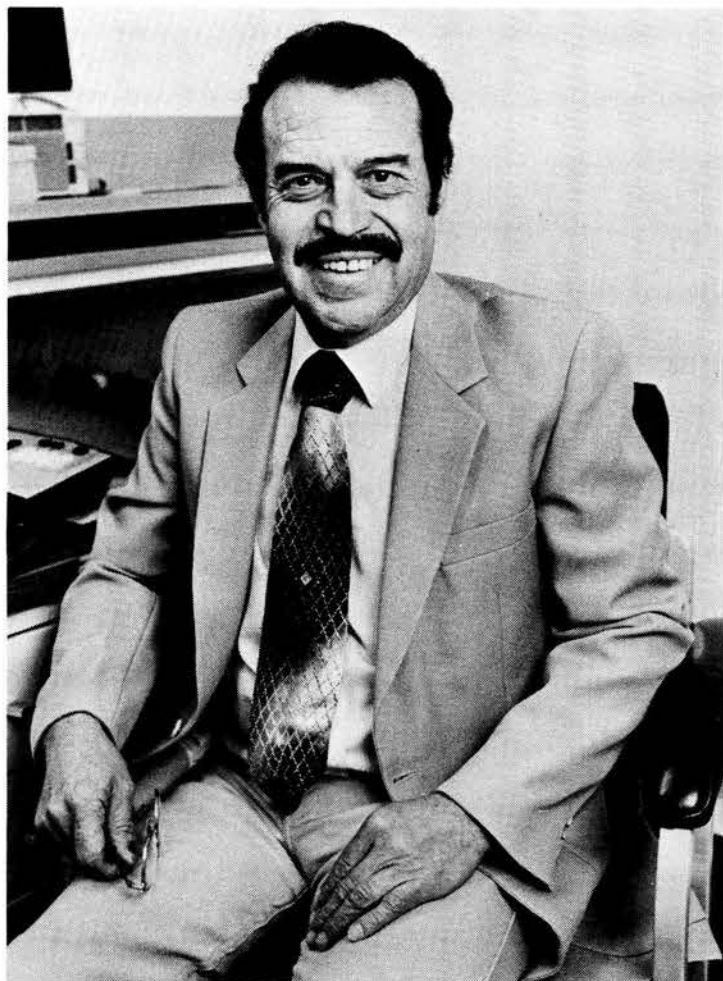
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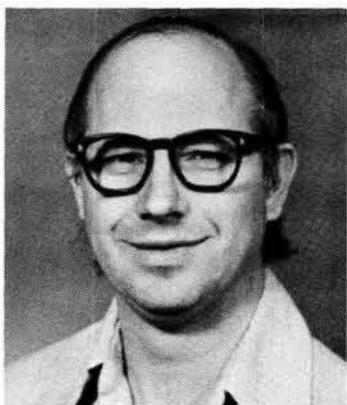
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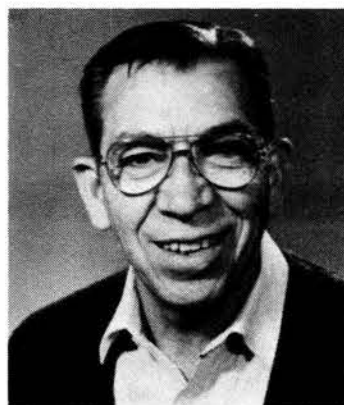
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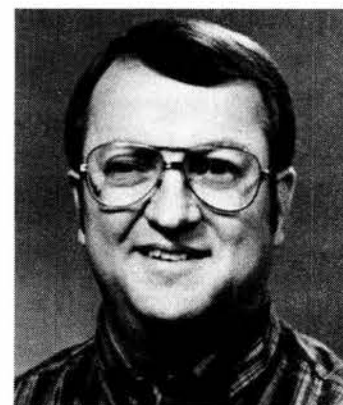
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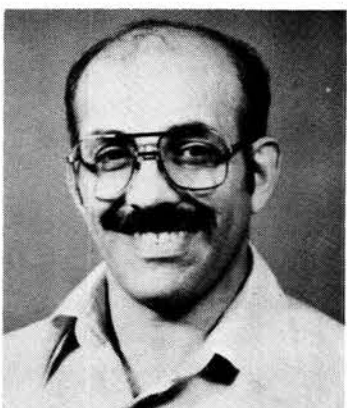
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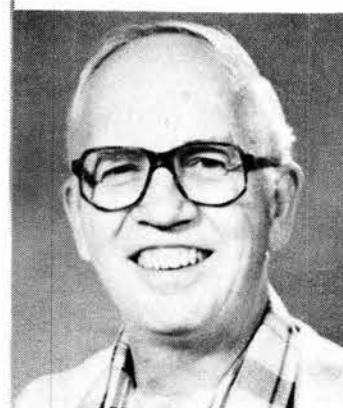
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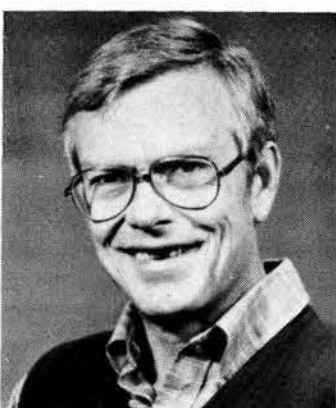
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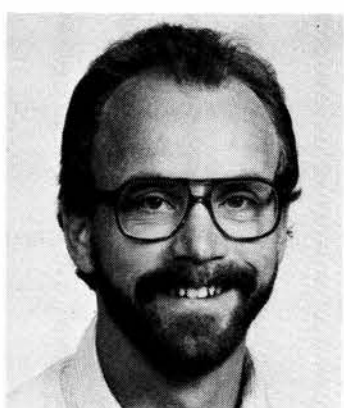
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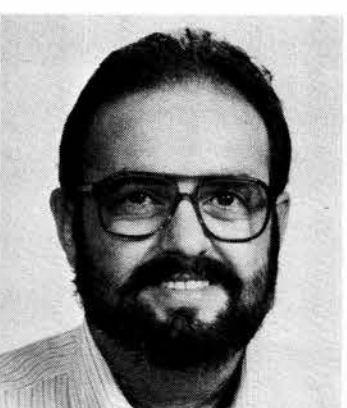
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Wayne Vine (7374) 20



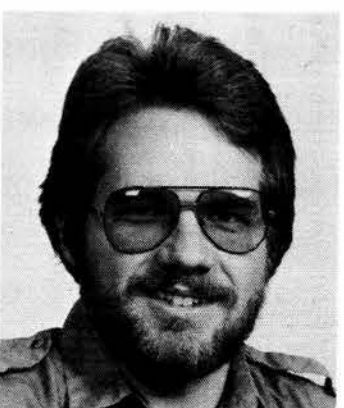
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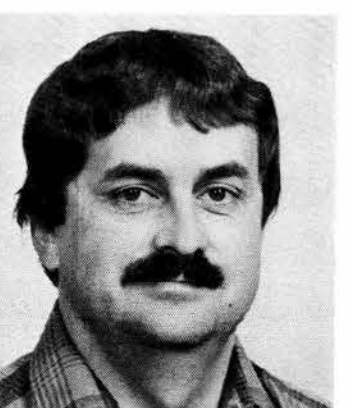
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Bill Purcell (8412) 15



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Miles Clift (8315) 15



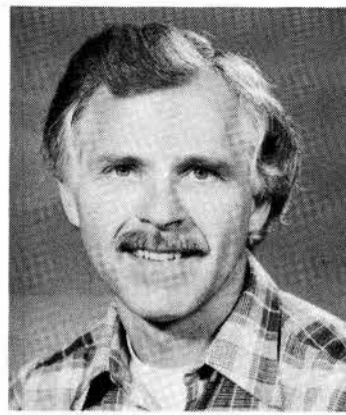
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Angie Rivera (2831) 35



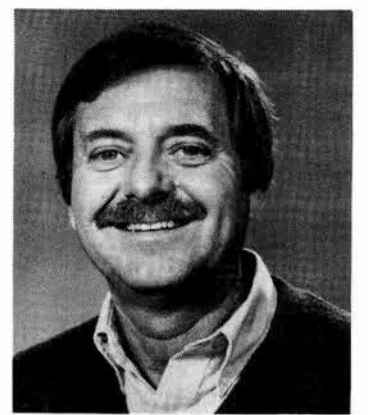
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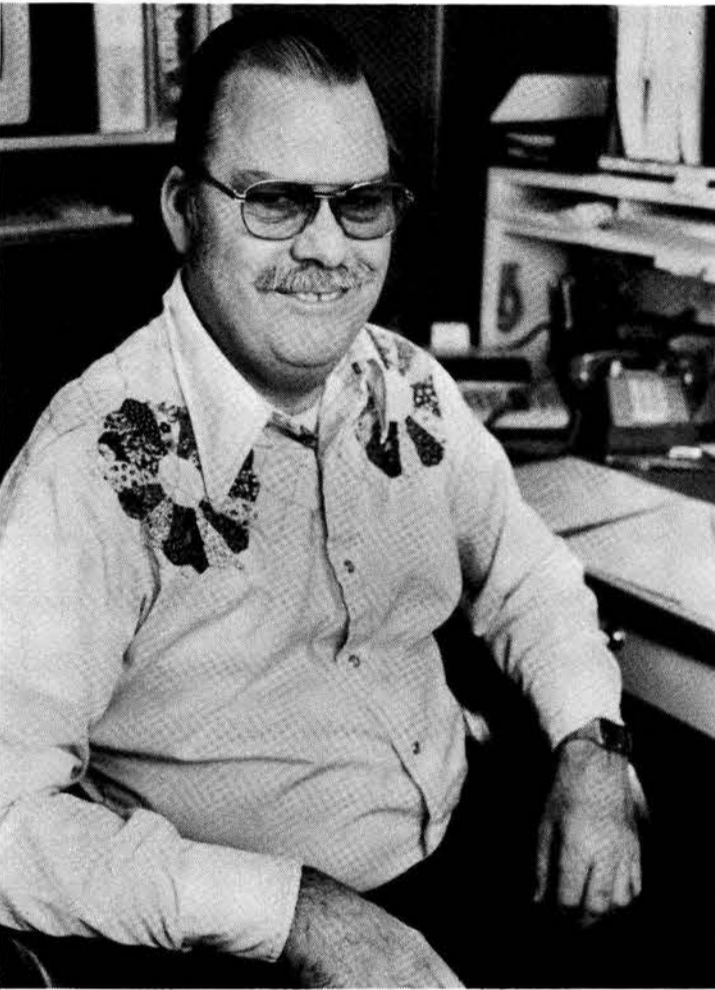
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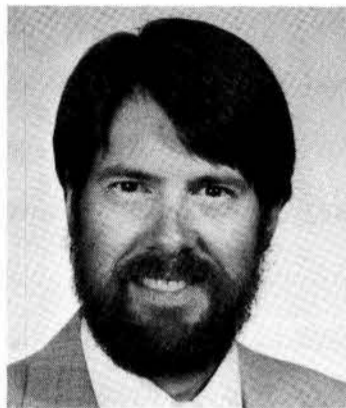
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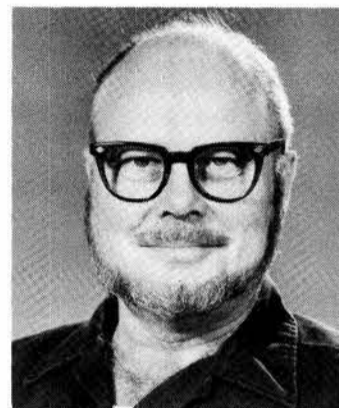
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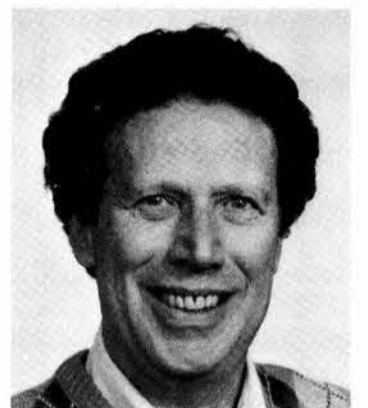
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Nick Wittmayer (8186) 20



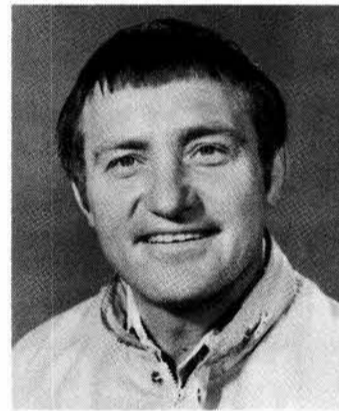
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Jerry Priebat (8161) 20



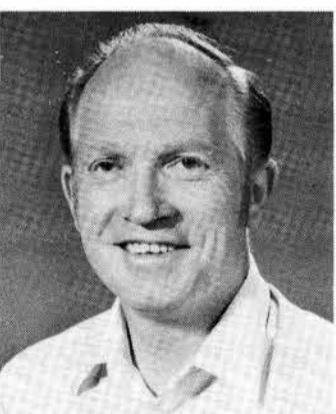
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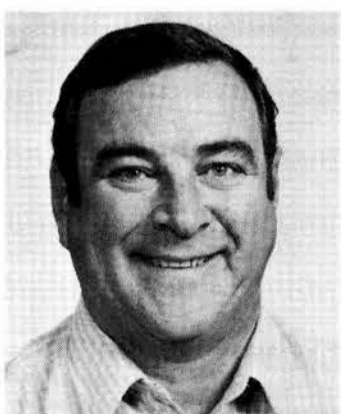
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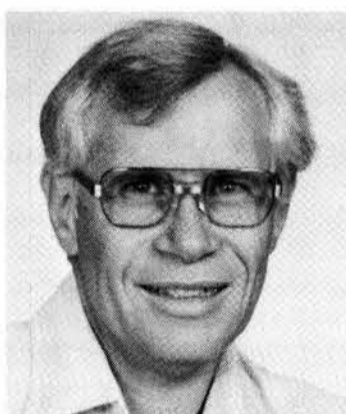
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Larry Pope (1834) 10



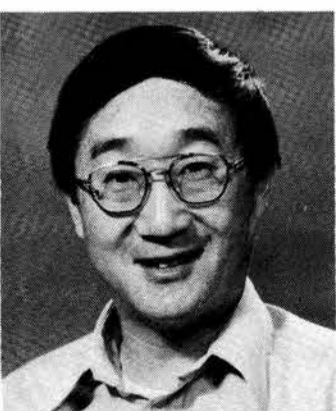
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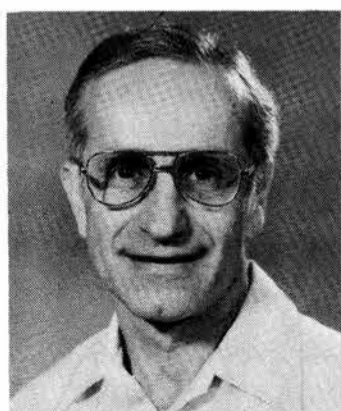
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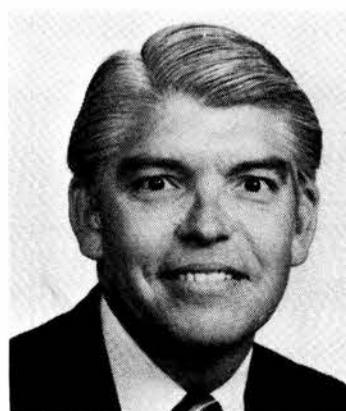
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Kwong Chu (1412) 10



Samuel Levy (2523) 25



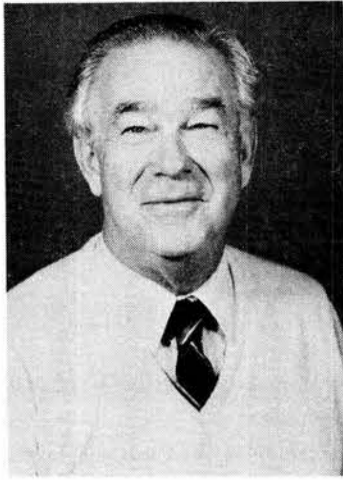
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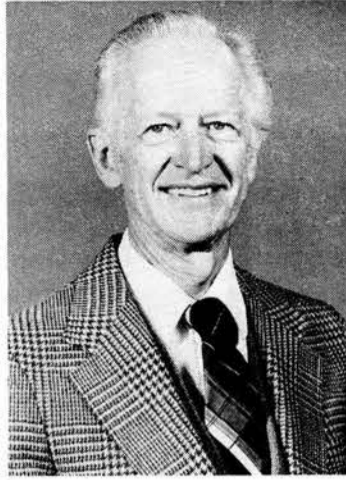
Eldon Frame (DMTS, 7266) 31



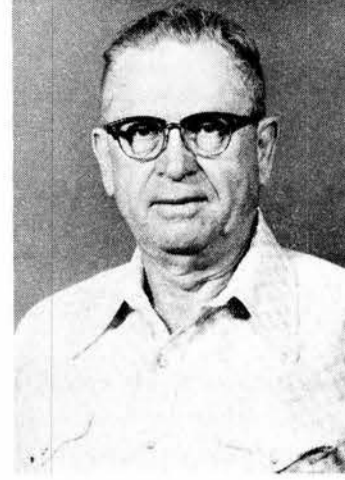
Bill Brion (2313) 30



Charles Duvall (2853) 25



Chet Ricker (3552) 35



Charles McKeever (2561) 33

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3. Submit each ad in writing. No phone-ins.
4. Use 8 1/2 by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same ad.
9. No "For Rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

SKIS, Olin 150cm, Salomon bindings, \$70; Dachstein size 7-1/2 red ski boots, \$35; child's medium ski bib, \$10. Perrine, 293-1429.

SKI BOOTS, Heierling, size 7-1/2, blue/gray, \$20. Bornhoft, 821-7182.

HITACHI TURNTABLE, direct-drive, listed new for \$200, asking \$50. Miller, 281-9470.

TENT, 8' x 10', Sears Hillary, sleeps 4 adults, external frame, 6'6" center height, new \$150, asking \$85. Schkade, 292-5126.

SHOPSMITH MARK V table saw, lathe, drill-press disc and belt sander, band saw, jigsaw, joiner, \$2250; pop-up camper, 1986 Starcraft Starlite 17, sleeps 6, \$3200. Hesch, 892-2105.

CORDLESS SCRUB-BRUSHER, Black and Decker, rechargeable, complete kit (brushes and base), \$24. Barr, 821-5870.

STORM DOOR, 36" x 80", dark brown, \$125; 2 sets miniblinds, 58" x 35-3/4", orange or yellow, \$30/ea. Baca, 298-7748.

KAYPRO II PERSONAL COMPUTER w/64K memory, serial and parallel interface ports, \$500 OBO; Shopsmith Mark V and accessories, \$1250 OBO. Jones, 268-5236.

PAPASAN CHAIR w/cushion, wicker, \$30. Brigham, 293-6914.

SKI BOOTS, women's 4-1/2, Nordic, black w/yellow, used twice, list at \$85, best offer. Marchi, 291-9681.

KING-SIZE WATERBED MATTRESS, liner, and heater, \$30. Bland, 265-6286.

SKI BOOTS, Lange Z-Pro, men's 10-1/2 M, 2-1/2 years old. Cygan, 298-3628 evenings.

1982 SEARS REFRIGERATOR, 16 cu. ft., top freezer, frost-free, white, \$340. Coalson, 298-0061.

TWO STUDDER SNOW TIRES, E78-14, one mounted, \$50. Silverman, 298-1308.

WICKER BEDROOM SET, dresser, bookcase, footstool, \$75; Strollee child's car booster seat, \$10. Hen-

drick, 296-2163.

SKI LIFT TICKETS for Park City, Utah: 2 adult, \$20/ea.; 2 child, \$12/ea., good anytime. Verardo, 883-9778.

TABLE LAMPS, 31", brass, wood, milk glass, pleated cloth shades, fluorescent or incandescent, \$25/ea. or \$45/both. Ramel, 821-0475.

FIBERGLASS CAMPER SHELL, for wide long bed. Gallegos, 242-4797.

GEMEINHARDT FLUTE, recently reconditioned; skis, Kneissal 195cm w/Tyrolia 360 brakes; kids' skis w/brakes & boots, 140cm, 120cm, 110cm, 90cm, some new. Schaub, 265-0004.

TWO ALUMINUM WINDOW CASINGS, w/glass and screens, 5' x 2', \$25. DeReu, 275-2336.

CHAIN SAW, case, and tools, \$150; weight bench, extra weights, barbells, etc., \$25. Dean, 299-3281.

HUMIDIFIER, Arvin, 10-gal., automatic humidistat, 2-spd., 10-in. fan operation, self-cleaning, w/2-in. casters, \$40; Pachinko pinball machine, Super Deluxe, floor stand model, complete, \$50. Rodriguez, 296-3277.

TWO PAIR ROSSIGNOL 150 SKIS; 2 pair ski boots, Roces, size 7; children's ski clothes; pool table; baby swing. James, 294-6837.

MAIL BOX POSTS, \$4; w/mailbox and post, \$10; apt.-size refrigerator, \$75. Chavez, 842-6374.

SKIS, 120cm; new boots, 5-1/2; poles; 2 P185/80R13 tires; solid wood front door; Rangemaster hood; answering machine. Erickson, 294-8073.

TIRES: 155R80x12, any-weather Good-year Arrivas, 4 tires and wheels for \$100. Smith, 294-3413.

APT.-SIZE WASHER AND DRYER, Frigidaire, 110 outlet, beige, 2 yrs. old, \$400. Sanchez, 831-4643 evenings.

SOLID OAK SHELVING UNITS, approx. 70" H, 36" W, 20" D, 2 at \$65/ea. Kelly, 281-9774.

HAMMOND ORGAN, spinet, 2 keyboards, bass pedals, Rhythm II, Leslie speaker, percussion section, bench seat, \$1075. Ashworth, 281-2824.

DINING ROOM TABLE, 6 chairs, china cabinet, cherry wood, \$600 OBO. Bailey, 821-2471.

ELECTRIC TROLLING MOTOR w/canoe motor mount, 14 lb. thrust; dinette table w/4 chairs; exercise equipment. Johnston, 294-4574.

TWO-BAY STEEL CABINET, 30" D, 48" W, 76" H, front and rear doors, lockable, 400 plus pounds, \$20. Yingst, 884-3812.

UPRIGHT FREEZER, Carrier, 22-24 cu. ft., not frost-free, \$100. Bertholf, 296-7657.

GAS DRYER, Gibson heavy-duty vac-dry, permanent press, cool-down, timed, and auto-dry selections, 4 temps, \$75 OBO. Jones, 881-6006.

TWO FREE DOGS, to good home: 4 yrs. old, medium-sized, mixed-breed, shots, good watch dog; one-year-old female chow/malamute, spayed, shots, excellent w/children. Domingues, 821-9061 after 6.

NEW A78x13 WHITEWALL TIRE, bulletin board, bed frame, ceiling light fixtures, bamboo curtains, electric broom. Roan, 892-7299.

SILVER CORNET w/case, appraised at \$300, sell for \$250 OBO. Nation, 884-7013 after 5.

FOUR DATSUN STEEL RIMS, 185x14, 4-lug, \$30 for all. Bremer, 291-8297 leave message.

KING-SIZE WATERBED, mirrored headboard/bookcase, all accessories, \$125. Finch, 873-2664 evenings.

FOUR-DRAWER MAHOGANY CHEST, 19" x 46", 50 yrs. old, \$100 OBO; 1983 Amana electric microwave, full-size, used 6 months, almond color, cost \$1200, sell for \$700 OBO. Teta, 821-0659.

WASHER AND DRYER, Penney's, 18 lb., \$175 OBO. Allen, 299-1410.

KITCHEN TABLE w/leaf and 4 chairs, \$75. Robb, 821-2999.

X-C WAXLESS SKI SETS: 210cm Trak skis, 12M boots, poles, \$50; 180cm Trak skis, 7N boots, poles, \$25. Dippold, 821-5750.

NIKON FE 35mm CAMERA w/SB-10 electronic flash and 3 lenses: 28, 35-70, 60-200, 2X telephoto converter, \$300. Schneider, 299-6243.

DINING ROOM SET: glass and chrome, 36" x 72" table w/8 chairs, \$125. Owyong, 294-1884.

RHEEM 80-GAL. WATER HEATER, \$50; 240 VAC, 40-amp timer switch, \$10; child's car seat, \$10; 3-person dome tent, \$20. Sena, 298-1554.

TWO ELECTRONIC VIDEO GAME TABLES: "The Star Galaxy Fights Back" and "Pac Man," \$80/ea. Sheldon, 293-0467.

ANTIQUE DINING TABLE, walnut, oval, 6 cane-bottom chairs, \$1200. Adams, 823-1845.

TWO-WHEELED HORSE CART w/nylon web harness, \$375. Turpin, 281-5933.

SYLVANIA COLOR TV, 25-in. console w/remote control, swivel base, 2 years old, \$350 OBO. Garcia, 292-0979.

TWO SINGLE-BED HEADBOARDS and frames, 4' fluorescent light, range hood. Finning, 298-0743.

WASHER AND DRYER, Montgomery Ward, large-capacity, avocado, more than 10 years old, both work, \$150; brown vinyl recliner, \$35. Graham, 293-7302.

TWO SNOW TIRES, steel-belted radials, 175SR-14, mounted on 5-hole metric rims, \$60. Lagasse, 293-0385.

POOL TABLE, 4' x 8', Classic, \$650; walker-exerciser, Sears, \$150; washer and dryer, \$80; upright vacuum cleaner, \$10; tabletop oven, \$10. Johnson, 296-1917.

FREEZER, Sears, 16 cu. ft., upright, frost-free, \$230; Yamaha flute, \$135. Caskey, 294-3218.

CRAMPONS, 10-point, w/protectors, \$25; ironing board, \$10; 2 irons, \$3 and \$7. Auerbach, 296-1489.

SNOW TIRES and wheels for Volvo, 185X70 R-14, 80 percent tread remaining, \$50/pair. Irwin, 822-1831.

TRANSPORTATION

'83 TOYOTA CELICA GTS LIFTBACK, 5-spd., AC, sunroof, stereo cassette deck w/equalizer, 25K miles, one owner. Bray, 291-0591.

'83 FORD RANGER XLT 4-WD pickup, chrome wheels, AM/FM stereo, \$500 down, take over payments OBO. Courtney, 1-864-3184.

'78 VW RABBIT, 2-dr., 50.5K miles, AM/FM cassette, new tires, \$1200 OBO. Van Geet, 884-7325.

'65 INTERNATIONAL PICKUP, 3/4-ton, 4 x 4, heavy-duty rack. Gallegos, 242-4797.

'81 HONDA CIVIC GL HATCHBACK, AC, AM/FM cassette, 53K miles, dark brown, \$3450. Baca, 298-7748.

'74 CHEV. MONTE CARLO, radials, PS, PB, PW, tilt wheel, Blaupunkt AM/FM cassette stereo, \$1000. Harrison, 292-6856 evenings.

'81 JEEP CJ-7, adult-driven; '54 Ford Customliner, 4-dr., new interior, exterior, tires, etc. Schaub, 821-7242 after 5.

'79 DODGE OMNI 024 HATCHBACK, 46K miles, new paint, \$1500 OBO. Weaver, 291-0954.

'81 HONDA CIVIC, 4-dr., AC, AM/ FM cassette, 5-spd., 75K miles, \$3400. Baca, 292-5342.

'69 BUICK ELECTRA 225, 4-dr., needs paint. Harrison, 883-5411.

'82 TOYOTA SUPRA, 42K miles, new radials, \$8300. Bland, 888-0565.

'61 DODGE LANCER, 4-dr., AT, 200K miles, one owner, needs front end work and tires, \$875. Austin, 298-5352.

'53 POWERWAGON MILITARY 4X4 AMBULANCE, rebuilt engine and drivetrain; 1/2-ton military trailer, \$3500/ both. Pryor, 294-6980.

'74 FORD ECONOLINE 100 VAN, new tires, 302 V-8, carpeted, \$1800. Byers, 298-8326.

'78 CORVETTE PACE CAR, L-82, 4-spd., 55K miles, \$8500 OBO. Meeks, 821-7390.

'65 SCOUT 4-WD, 55K miles. Dean, 299-3281.

'75 PONTIAC CONVERTIBLE, \$950. Hente, 293-1546.

'84 PONTIAC FIERO, 20K miles, AC, tilt wheel, AM/FM tape, cover, bra, transferable warranty, \$6300. Walker, 294-4087.

'77 OLDS ROYALE, 350, AC, stereo, AT, maintenance record furnished, \$1500. Johnson, 884-9165.

'77 DODGE CUSTOM VAN, 81K miles, factory conversion package, \$3300 OBO. Romero, 1-864-6254.

'79 FIREBIRD, fully equipped, one owner, \$2995. Brown, 821-4355.

'85 HONDA 3-WHEELER, ATC 110, purchased 12/85, w/helmet, \$500. Gregory, 293-2080.

'78 DATSUN 2-DR. HATCHBACK B-210, 5-spd., new tires, stereo, battery, \$1350 OBO. Rodriguez, 296-3277.

'81 YAMAHA 650, direct-drive, 25K miles. Finch, 873-2664 evenings.

'79 DATSUN 510 SW, \$1800 OBO. Geck, 299-5095.

'87 ACURA LEGEND, sunroof. Kidd, 299-0035.

'78 HONDA CVCC HATCHBACK, 38 mpg, rebuilt engine, new radials, brakes, etc., \$1400. Lehrer, 831-4360.

'73 VOLVO, 4-spd., AM/FM cassette, new tires, \$1400 OBO. Romero, 281-3687.

'82 TOYOTA 4X4, AC, sunroof, PS, PB, AM/FM, 65.5K miles, \$4900. Eagan, 281-9589.

'84 PONTIAC FIERO-SE, 27K miles, 4-spd., tilt wheel, Eagle-GT radials, white, sunroof, luggage rack, \$6500. Calvin, 897-0607.

'75 AUDI FOX, fuel-injection, AC, AT, AM/FM tape, new radials and battery, original owner, \$2300. Drotning, 294-4807.

'78 FORD PINTO HATCHBACK, AT, 48K miles, \$1100. Walck, 294-8757 after 5.

'79 DODGE OMNI, new engine and clutch, front wheel drive, AM/FM cassette, \$2000 OBO. Sanchez, 294-0624 or 884-9389.

MEN'S 10-SPD. BICYCLE, 26", Schwinn, burgundy, \$65. Sheldon, 293-0467.

'81 TOYOTA SW, 5-spd., AC, AM/ FM cassette, new tires and struts, \$2250; '72 Pontiac Venture, 307 V-8, AT, PS, AC, AM/FM cassette, \$1450. Babb, 898-8591.

'80 DATSUN 4X4 PICKUP, long bed, w/Glasstite camper shell, AC, AM/ FM cassette, sheepskin seat covers, \$1850 OBO. Turpin, 281-5933.

WOMEN'S 10-SPD. BICYCLE, 26", \$60. Gendreau, 268-3436.

'78 FORD GRANADA, 2-dr., V-8, 67K miles, \$1700; '76 GMC Sierra Classic Trailing Special 1/2-ton truck, 67K miles, all-weather tires. Vigil, 821-8059.

'84 HONDA V-4 MAGNA, water-cooled, 2-yr. warranty, 3.5K miles, \$500 down, take over \$2000 balance. Jimenez, 299-7203.

REAL ESTATE

3-BDR. HOME, NE Heights near Heritage Hills, 1-3/4 baths, LR, DR, FR w/bar, mountain view, \$96,500. Gregory, 821-2125.

3-BDR. MOSSMAN HOME, 2130 sq. ft., gourmet kitchen, updated baths, hardwood floors, landscaping, \$129,500. Marder, 883-3863.

ANGEL FIRE LOT, close to ski lift, take over payments. Roseth, 296-8842.

4-BDR. HOME in far NE Heights, 1775 sq. ft., FR w/FP, LR, landscaping, sprinklers, \$92,500. Roth, 821-3899.

WANTED

SKIS, 180-185cm, reasonably priced, in good condition w/bindings and brakes. Perrine, 293-1429.

TWO STEREO SPEAKERS. Stuart, 299-9190.

ONE- OR TWO-CAR GARAGE(S) to rent in Rio Rancho for storage of classic cars, no repairs performed. Roan, 892-7299.

USED DRYER. Altwies, 292-3884.

LIONEL .027-gauge train equipment, especially electric switches, signal lights, and special-function cars. Prior, 281-5532 after 6.

BABYSITTER, needed for six-month-old, our home, 12-4 p.m. Mon.-Fri., non-smoker, references required. Nation, 884-7013.

35mm SLIDE PROJECTOR, manual or remote. Schuch, 296-4570.

ANTLERS, any size, any type. Dubicka, 296-6557.

VW BUG with sunroof. Cropp, 296-1877.

LOST & FOUND

MEN'S AVIATOR-STYLE prescription glasses, found in 822A Conference Room. Jackson, 844-8290.

MAN'S RAINCOAT lost, blue denim, car coat-length, Sears label. Schubeck, 821-3133.

That Well-Known Brunch Packs a Sunday Punch!

NO HUMBLE PIE on the menu for the brunch bunch that gets together at the C-Club on Sundays. Instead, it's baron of beef, BBQ chicken, a vegetable, scrambled eggs, bacon, hash browns, that famous green chile, full salad bar (including potato salad and macaroni salad), and desserts — all for the unbeatable tab of \$5.95 (kids under 12 half price). How do you get in on this deal? Just call in a reservation (265-6791), and show up at the Club on either Jan. 18 or Jan. 25 between 10 a.m. and 2 p.m. Easy as pie . . . but not humble, thank you.

SWING AND SWAY next Friday night (Jan. 23) to the Big Band sounds of Don Lesmen and his group. The dancing starts at 8 p.m., right after the two-for-one special dinner featuring prime rib or snow crab — your choice of two entrees for the low, low price of \$14.95. Lesmen and crew keep the decibel level just right when they play those golden oldies, and there's always an extra bonus: You can even understand the words! Your company is requested — along with a reservation, please.

CALLING ALL MIDNIGHT COWBOYS — Saddle up and ride on over to the Club on Jan. 24 for the big Western Night celebration. Start things out with an all-you-can-eat buffet, served from 6-9 p.m., featuring finger-lickin' good BBQ ribs and chicken, full salad bar, baked potatoes, and a vegetable. The nice price for all this good food — \$6.95/person — won't eat a hole in your jeans pocket, either. Then the Poor Boys come in by stagecoach (does it *really* stop in Isleta?) to belt out the sagebrush shuffle-and-stomp music from 8 to midnight. By the way, podner — don't forget to make a reservation. You wouldn't want to be left out in the cold on a night like that, now would you?

And speaking of the Isleta Poor Boys, just a reminder: They're playing that good c/w music tonight, too, right after the two-for-one special (filet mignon or poached halibut).

IT'S SUPER SUNDAY for more reasons than one. On Jan. 25, after you enjoy Super Brunch, drift on in to the main lounge to watch you-know-what. You can view the action on a couple of big-screen TVs, but be sure to get there early for a front-row seat. Joe, the friendly bartender, opens the doors at 12 noon. He'll serve up free munchies and your favorite libations all afternoon while you cheer for your favorite team in The Big Game. (If you're asking *what* big game, chances are you've been on another planet for the last couple of weeks!)

THE BIGGEST GRINS IN TOWN are worn these days by members of the Coronado Ski Club. There's snow in them thar hills, and these folks are making the most of it. (After last winter, it's about time, right?) This weekend, everybody's heading for Steamboat Springs; then they're off to Telluride on Jan. 30. In between, this month's Ski Club meeting is scheduled Jan. 20 at 7 p.m. The program highlights cross-country ski trails; as usual, fabulous door prizes will go to a few lucky winners.

T-BIRD CARD SHARKS have the *second* biggest grins, because they really enjoy themselves at those shuffle-and-deal sessions a couple of times a month. The sharks got off to a fast start for 1987 last week, and will get together again on Jan. 22 for more fun and games. The action starts at 10:30 a.m. Come on out and join the festivities; it's a sure-fire way to cure those after-the-holidays blues.

MIX A LITTLE BROWN SUGAR with some filet mignon or shrimp and you have the recipe for a fun-filled evening two weeks from tonight, Jan. 30. A group called Brown Sugar plays tunes with a Latin beat for dancing from 8 p.m. to midnight. Beforehand, take advantage of the two-for-one special

featuring the other two ingredients listed above. Here a rhumba, there a samba, everywhere a rhumba-samba . . .

COME FLY WITH ME, or take a bus, or *something*. But whatever you do, be sure to sign up for some of the tremendous trips the C-Club Travel Committee has arranged:

Klondike Kaleidoscope — And what a variegated picture it is! This cruise/land (or cruise only) trip to Alaska in September has something for everybody, and that's no exaggeration. The gorgeous scenery in our biggest state is worth the price of admission all by itself. But in addition to that, the cruise/land travelers have a city tour of Anchorage; a ride on the McKinley Explorer train to Denali, from which they travel to Mt. McKinley National Park; and a visit to Fairbanks, where there's a city tour and a stern-wheeler inland cruise. Upon their return to Anchorage, they meet the cruise-only types and proceed to Whittier to board the *Regent Sea*, a truly magnificent ship, for a one-week cruise to Vancouver. Sights along the way include the Columbia Glacier (this continent's most active tidewater glacier) and Hubbard Glacier (believe it or not, it's five miles wide!). Ports of call are Juneau (the capital), Ketchikan (where the totem poles are), and Skagway (of Klondike fame). Last stop is Vancouver, from which everybody flies home to Albuquerque. Cost of the complete cruise/land package (Sept. 8-20) is \$2125/person, double occupancy; for the cruise only (Sept. 13-20), it's \$1442. Cheaper rates are available for triple or quad occupancy. Included are all transportation and transfers, all meals on the cruise, lodging along the way, and taxes/tips. A \$200 deposit by Jan. 31 guarantees those prices (after that date they're higher, but you can still sign up). Final payment's due by July 20.

San Antonio Safari — Included in this one, scheduled March 15-18, are a full day of sightseeing in SA; a trip to the Texas hill country, with stops at the LBJ Ranch at Stonewall, the old German community of Fredericksburg, and Kerrville (lunch at Inn of the Hills); and the St. Patrick's Day celebration on SA's Riverwalk — green river and all! You stay at the Menger Hotel, which is close to the Alamo and steps away from the Riverwalk. The \$421/person tab covers all of the above, RT air fare, three

nights' lodging, and a couple of other special meals. You can learn more about what's in store on this trip by attending a special travel presentation on San Antonio (including video), scheduled Feb. 2 at 7 p.m. in the Eldorado room.

D.C. Delight — With historic Virginia thrown in. And what a time to be there (April 4-11). The cherry blossoms are in full bloom in Washington, and when that happens, Beltway types really celebrate, with parades and pageantry all over the place. Also in D.C., you'll visit the White House, Capitol Hill, the Smithsonian, and more. Next door in Virginia, you can relive history as you explore places such as Williamsburg, Richmond, Jamestown, Yorktown, and some very impressive mansions — Mount Vernon and Monticello. All of this goes for \$777/person, which covers seven nights' lodging, transportation (air and charter bus), some meals, and all that sightseeing.

Laughlin Lark — Fun seekers always go for these trips to Laughlin, Nev. — better known in the trade as Las Vegas South. You enjoy three solid days of action (Feb. 20-22) on this one, with Laughlin's gaming tables at center stage. If your luck runs out, don't despair; you can get away from it all with side trips to Lake Mohave and Davis Dam. The bargain-basement price of \$105/person covers two nights' lodging at the fabulous Riverside Hotel, several meals, RT charter bus fare, snacks and drinks along the way, and taxes/tips. Closet gamblers, unite — go for it!

Sympathy

To Roseanna Latham (3153) on the death of her husband in Albuquerque, Jan. 2.

To Kim Atchison (2564) on the death of her mother in Oklahoma City, Jan. 4.

To Carol Ondrias (1540) on the death of her father in New Jersey, Jan. 9.

Three Pounds of Home, Please



David Wilcox of F. C. Tucker Co. in Indianapolis has put the cost of housing in a different perspective. Mr. Wilcox figures a 2,000-square-foot home costing \$100,000 (excluding the lot) weighs about 339,000 pounds. That works out to 29 cents a pound — less than chicken at 65 cents a pound or a Rolls Royce at \$20 a pound.

Wall Street Journal



END OF YEAR left Benefits with more than 15,000 envelopes to stuff and so 19 students and 3 teachers came to the department's rescue. "This arrangement is based on a cooperative agreement between Valley High School and Career Services for the Handicapped [CSH]," says June Aydelotte (3543), coordinator of employee services. "The contract benefits both Sandia and the students, who gain opportunities for career exploration and job experience." Temporary help during peak loads at Sandia is handled on a Purchasing contract, now in its fifth year, administered by Cynthia Schneeberger (3726). Job assignments are arranged through Mary Modrow, director of supervised employment at CSH, who in turn works through the APS Special Ed Work-Study Program. As many as 30 disabled individuals work in clerical support at the Labs' uncleared areas.